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SELECTED TRANSLATIONS ON COMMUNIST CHINA'S CHEMICAL INDUSTRY

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SELECTED TRANSLATIONS ON COMMUNIST CHINA'S CHEMICAL INDUSTRY

[Following is a translation of selected articles from the Chinese-language periodical Hua-hsueh Kung-yeh (Chemical Industry), Peiping, No. 3, 6 February 1960. Page and author, if any, are given under individual article headings.]

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I. A SIMPLE METHOD OF CARBON BLACK PRODUCTION BY MEANS OF AN ABRASIVE-RESISTANT FURNACE

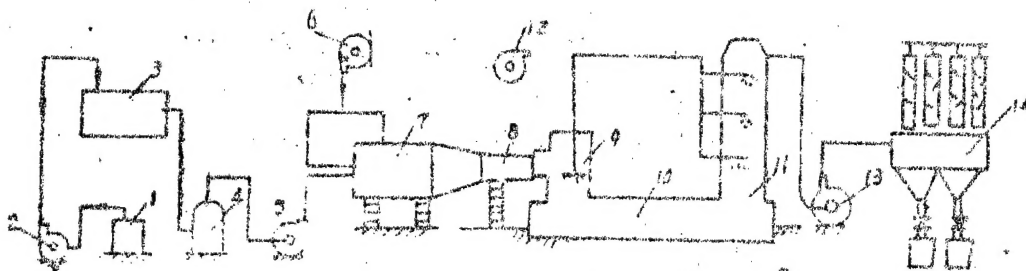
Pages 24-25

Tientsin City
Carbon Black Plant

Following the success of the experimental production of carbon black with an abrasive-resistant furnace, this plant, based on the existing available techniques plus the decision to use little or no steel in construction, produced in 3 days of continuous work a simple abrasive-resistant furnace for the production of carbon black; the equipment has since been successfully and smoothly put into production. Up to now, the operation has been very satisfactory with a rate of 100 kilograms per furnace hour; the product is comparable to products produced by imported machinery, and sometimes the quality of our carbon black is even better. We believe that under the present high speed development of China's carbon black industry, the full implementation of the party's policy of walking on both legs and the promotion of the simple abrasive-resistant process are truly significant.

A. Explanation of the Production Process

The production of carbon black by means of the abrasive-resistant furnace process is based on the incomplete combustion and heat cracking reaction when oil and air of a definite ratio are injected into the furnace under certain temperature conditions. The final product is formed when there is completed a cycle of quenching, activation, cooling, collection and wrapping. The production process is given below:



Gas tar, the raw material, is stored in tank (1) and is pumped to the dehydration tank (3) by means of pump (2), dehydration is performed by means of direct heating in the range of 90-100° C. The dehydrated gas tar which is then pumped into the gas tar pipe inside the furnace by means of a high pressure oil pump (5) after passing through filter (4) is atomized and injected into the furnace in the form of fine particles by means of the nozzle at the tip of the pipe; in the meantime, air of definite volume is sent into the carbon black reaction chamber both from the axial and the tangential directions by a high pressure blower (6). Under high temperature condition (1,380 - 1,400° C), fine oil particles form carbon black and other gases after undergoing incomplete combustion and cracking process. Hot carbon black mixture gas is quenched to 600-800° C by the cooling water sprayed by pump (12) after reaching the quenching section (9) via the gas channel (8); the quenched gas is then sent to the atomizing cooling tower (11) via the activation gas channel (10). The temperature of the carbon black gas mixture is further cooled to 230-250° C inside the tower by the cooling water sprayed by pump (12); the gas is then transferred to bag filter (14) by means of an exhaustor (13). Inside the bag filter (14), carbon is being continuously separated and caught by a funnel where the product is packed and inspected before being put into storage.

B. Technical Conditions

1. Specifications of raw material (gas tar).

viscosity (100° C):	1.72 poise
flash point (open):	99° C
distillation fraction:	below 170° C -- 0.1%
	170-230° C -- 8.4%
	230-270° C -- 15.45%
	270-300° C -- 3.25%
	300-360° C -- 12.25%

2. Gas mixture composition inside the gas channel (dry volume %):

CO ₂	-- 4.32%
CnHm	-- 0.12%
O ₂	-- 3.15 %
CO	-- 14.31%
CH ₄	-- 1.10%
H ₂	-- 4.90%
N ₂	-- 72.10%

3. Quality of carbon black product:

(a) Results of property test:

coloring ability	--	124
moisture	--	1.97%
dust	--	0.05%
volatile portion	--	3.8%
D.P.G. absorption	--	17.5%
pH value	--	7.0

(b) The physical and mechanical properties of rubber made of this type of carbon black are given in Table 1 below:

Table 1

Vulcanization condition		Tensile strength	Elongation,	Wear	Stress at 300% elongation,	Hardness (shao scale)	Permanent deformation,
Temp	Time	kg/cm ²	%	cm ³ / 1.61 km	kg/cm ²		%
142°C	10 min.	177	515		68.1	59	50
	15 min.	240	545		85.5	62	32.8
	20 min.	273.7	567		93.8	64	30
	30 min.	300	570		112.5	66	28.1
	40 min	309	555	0.271	119	66	30

4. Gas tar and air ratio :

In actual operation, the gas tar-air ratio should be constantly adjusted to maintain it at a constant level, which is determined by the practical situation according to the quality of the product.

5. The ratio of axial and tangential air intake.

The more the axial air intake the less is the carbon black production, however, the granules are in finer form. The volume of tangential air intake has little effect on the quality and quantity of carbon black produced, but it has a definite effect on the furnace temperature. The actual ratio of these two air intakes should be determined by the practical cases.

6. Oil temperature and pressure.

The oil furnace inlet temperature should be maintained near 90° C, so that atomization can be performed conveniently. Oil pressure should be maintained above 6 kg/cm².

7. Axial air velocity.

The velocity of axial flow air should have a high velocity so that atomization can be easily performed.

8. Temperature-pressure index of production system.

(a) Temperature:

combustion chamber	--	1,370° C
after quenching	--	650° C
after cooling tower	--	220° C
before entering bag filter	--	120° C.

(b) Pressure:

inside the furnace	--	15 mm H ₂ O
exhauster inlet	--	35 mm H ₂ O
Bag filter inlet	--	120 mm H ₂ O

C. Major Equipment List

The equipment used in this simple device is given in Table 2. A total of 4 tons of steel is used.

Table 2. Major Equipment List

<u>Item</u>	<u>Principal characteristics</u>	<u>Quantity</u>
1. Oil pump for dehydration	Flow rate -- 5 m ³ /hr; pressure -- 3 kg/cm ²	1
2. Dehydration tank	Capacity -- 4 m ³ ; Ø 1400x2600, steel	2
3. Filter	Ø 300x850 (mm), steel	2
4. High pressure oil pump	Flow rate -- 1 m ³ /hr; pressure -- 6-9 kg/cm ² ; steel	1

<u>Item</u>	<u>Principal characteristics</u>	<u>Quantity</u>
5. High pressure blower	Flow rate -- 2100 m ³ /hr; air pressure -- 600 mm H ₂ O	1
6. Carbon black reaction furnace	Chamber wall is made of refractory bricks and the outer wall is made of ordinary bricks; asbestos is sandwiched in between these brick walls, steel rods are also added to reinforce the structure, preventing cracks caused by furnace body expansion.	1
7. Quenching device	φ 500x800 (mm); with atomizer and cooling jacket; steel	1
8. Cooling tower	Inner wall uses clay refractory bricks and outer wall uses ordinary bricks, asbestos is sandwiched in; the outer surface of the tower is painted with caulking powder; φ 450 mm; over-all height -- 5 m.	1
9. Exhauster	Flow rate -- 4600 m ³ /hr; air pressure -- 1600 mm H ₂ O; steel	1
10. Atomization water pump	Flow rate -- 2-3 m ³ /hr; pressure -- 3 kg/cm ²	1
11. Bag filter	Filtering area -- 250 m ² ; four chambers; funnel is made of asbestos plate	1
12. Hole-plate flow rate meter		2
13. Thermal couple (high temperature)	Temperature range -- 1200-1600° C and 500-900° C each	2

D. Operational Conditions

In the operation of the past two months, no cracking has been discovered in the furnace chamber, brick-lined cooling tower, carbon black and gas mixture channels (φ 300 mm ceramic pipes). Owing to the thick furnace wall, thermal insulation is pretty good; the fluctuation of furnace temperature due to short duration

stop of operation is very little; therefore, both the quantity and quality of the product are uniform. Because of the high efficiency of the quenching device, normal operation of the bag filter can be maintained even without water spray inside the cooling tower. We expect the life span of the brick lined cooling tower will be longer than a steel structure. Due to the good thermal insulation efficiency of ceramic pipes, no steam condensation has been discovered on the pipe wall; meanwhile, the corrosion-resistant ceramic pipe reduces the mechanical impurities in carbon black. This action has a definite effect on the improvement of the quality of carbon black produced.

E. Principal Technical and Economic Indexes

The production of every ton of carbon black by means of the abrasive-resistant furnace process uses 4 tons of gas tar, 2.5 tons of cooling water, 200 kilowatts of electricity, and 0.5 tons of coal.

In general, we believe that the greatest advantage of the simple abrasive-resistant furnace process is the corrosion-resistant property of the equipment; it not only reduces the impurity of carbon black, but also greatly increases the life span of the furnace. Therefore, the use of this native method at a time when we must save steel certainly possesses significance both politically and economically. However, owing to some complications in production control, some steel materials that are still being used in the equipment (such as for the indirect reduction of the water content in steam, in the cyclic separator in the collection of carbon black, etc.), are being improved.

II. INITIAL EXPERIENCE IN RAISING OUTPUT RATE OF AGRICULTURAL CHEMICALS IN KIANGSU PROVINCE

Pages 33-34

Bureau of Heavy Industry,
Kiangsu Province

Last year, this province, under the guidance of the light of the general line and the leadership of the Ministry of Chemical Industry, and of the party's provincial and local secretaries, plus the great effort of the masses, achieved a continuous great forward leap, bettering the successes achieved in agricultural chemical production in 1958. According to preliminary statistics, the total production of agricultural chemicals in 1959 was 11,589.75 tons which is 138.84% of the 8,637 tons specified in the first state plan, 115.9% of the 9,700 tons in the second plan, and 6.8 times what had been achieved in the 1958 great forward leap. A comparison of the output of major items during these two years is given below: production of Ti-pe-ch'ung is up 26.7 times, polybarium sulfide is up 36.5 times; dinitrobenzene sulfocyanate is up 4.07 times, and all other finished insecticides have also been sharply increased. The total value of production in 1959 almost doubled 1958. Furthermore, the quality of agricultural chemicals has also been improved; for instance, the content of Ti-pe-chung has reached 70%; the content of barium sulfide in polybarium sulfide has reached a steady level of 40-45%, etc. There were 14 new items successfully produced in 1959; among them, I-ma-lung and ethyl Ma-la-sung are high-efficiency insecticides. Basic costs in making those chemicals have also been lowered. In addition, inspection and supervision programs have been strengthened to ensure a product of better quality. To promote the application of these insecticides, work has been carried out and more than 200 persons have been technically trained to add new blood to this force. The completion of national plans and the fruitful results of the program have once more proved that our general line for socialist construction is correct and that our party's leadership is brilliant.

Reviewing the work of the past year, we are of the following opinion on the production of agricultural chemicals.

There are many different kinds of farm insecticides, especially for the prevention of wheat rust. However, based on the actual raw material situation, technical condition, and the needs of agricultural departments in this province, we believe that our best program should be primarily based on the production of polybarium sulfide plus some dinitrobenzene sulfocyanate. According to preliminary tests and Soviet reports, the former offers very good result in combating wheat rust; furthermore,

it is easy to produce, requires little equipment and only a short time is needed for furnace construction. In general, it offers a quick start. Besides, if mixed with limestone, one quarter of the amount of sulfur normally used can be saved. Barytes, which is used as a raw material, exist in great quantity in this province, and mining can be quickly organized. Various areas also possess the capability for the crushing of barytes. Based on all these conditions, a large program aiming at the production of polybarium sulfide as the main product plus the promotion of the production of other insecticides was established in various areas of this province. The program put emphasis on "homemade furnace first, modern furnace follows; mining first, transportation next; crushing, first, treatment next; product first, adjustment and shipping next." Therefore, a hot polybarium sulfide production program was quickly developed. For example, 120 homemade refractory furnaces were completed in the Cheng-kiang district within one week. They have the capability of producing 1,900 tons of semi-finished chemicals per month. Power equipment was kind of short in the chemical plant of Nan-tung Hsien, but two tractor engines were quickly and timely sent to them by the hsien's party secretary. The result was that 300 refractory furnaces with a capacity of 3,000 tons per month were completed within two months. Similarly, the production of dinitrobenzene sulfocyanate also followed thoroughly the policy of "use native method first, adjust to local conditions." For instance, the native method is used to make carbon bisulfide for the production of ammonium sulfocyanate in the Nanking Chemical Plant; and Soochow City uses synthetic methods to produce dinitrobenzene sulfocyanate from other organic items. After quality control was improved, Nan-tung City was able to raise the percentage of first grade polybarium sulfide from 12% to 65%, and the content of barium-sulfide was maintained at 40-45%.

III. CHEMICAL INDUSTRY NOTES

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Authors as noted

A. Dairen Chemical Plant Completed 180-Ton Daily Rate Coke Furnace

Ke Po

After studying Shih-ching-shan Steel Company's experience in the construction of its Red Flag coke furnace by using the native-modern approach, the Dairen Chemical Plant spent only 8 months, 50 tons of steel, and one million yuan investment in its construction of a Red Flag coke furnace, which has recently been put into operation producing 180 tons of coke daily to supply the basic needs of the plant. The completion of this furnace again demonstrates the correctness and greatness of the party's large-medium-small simultaneous approach and policy of combining native-modern methods.

B. Calcium Superphosphate Equipment Completed at the Canton East Sulfuric Acid Plant in Three Days

Unsigned

At the end of 1959, the Canton East Sulfuric Acid Plant used only three days to complete its 1,500 ton annual rate calcium superphosphate equipment. Trial runs show satisfactory operation, and more than 600 kilograms has been produced.

The flow sheet is simple and the technique is easy to control. The equipment used only 100 kilograms of steel, 10 tons of cement, 1.5 cubic meters of lumber, 2,000 bricks, one 2.8-kilowatt motor, and some porcelain containers and pipes. The total investment is only about 2,000 yuan.

C. New Blood for Calcium-Magnesium-Phosphorus Fertilizer Production in Kwangsi Province

Hu Shao-kang and Ho Chi-kuang

Under the leadership of the party's district and local committees and with the assistance given by fraternal plants, the Kwangsi Yi-shan Chemical Plant, with two and one half months great effort on the part of its vigorous members, completed a 10,000-ton annual rate calcium magnesium phosphorus fertilizer plant which was formally put into production last January. By now, the daily production has reached 28.5 tons, and the proportion of effective phosphorous is above 15%. Because of the special precaution given to economy and the substitution of white marble for olivine and white coal for coke, the cost of production has been cut down to a very low level, only 90 yuan per ton.

D. Technical Reform in Shanghai Reagent Factory

Shen Chung-liang

Members of the Shanghai Reagent Factory, which overfulfilled last year's production plan 62 days in advance, have again won the "open door victory" on the first day of 1960. They not only produced more products but also made technical reforms.

On that day, the sixth group of the first plant adopted a piping system and automation which increased productivity five times and brought their third grade products to second grade. The second plant's automatic dryer and automatic filtering device has been put into production and tested satisfactorily. To solve the problem of raw material shortage, the 7th alcohol section of the fourth plant successfully prepared "poly formol." Comrades of the third plant have learned to cut down the consumption of acetic acid in the oxidation of acetaldehyde. This will save 4 tons of chromium acetate annually and cut down basic costs by 30,000 yuan.

E. Chungking Tien-yuan Chemical Factory Invented New Light Weight Cyclic Type Crane

Unsigned

In the realization of this year's rapid mechanization and automation plans, members of the machinery repair shop in the Chungking Tien-yuan Chemical Plant quickly collected some used materials and on 7 January successfully completed Chung-tien -- an automatic cyclic-type light weight crane. Testing results show that the use of this crane in the shipping of oil products will increase the working efficiency five times; in hoisting coal, the efficiency is doubled, moreover, the labor of 12 men is saved.

The successful completion of this crane will gradually eliminate the heavy physical work and establish better shipping facilities to ensure the supply of raw materials.

F. Large Scale Chemical Fertilizer Production in the Loyang District to Basically Ensure a Supply for Cotton and Wheat Farms

Hu Hsien-tsung

To ensure this year's bumper harvest, the Loyang District in Honan Province, based on the spirit of supporting agriculture by industry, on the policy of thoroughly carrying out the union of large-medium-small industries and of native and modern dual approach, has mobilized all the people in the district to participate in an ambitious chemical fertilizer production plan,

with a result that many small chemical fertilizer plants have been established in the cities, hsiens, and communes. There is now a spectacular tide of people's chemical fertilizer production. By 14 January of this year, the Loyang District had established 1,205 chemical and chemical fertilizer plants, produced 1,508 tons of chemical fertilizer, 55,882 tons of native type chemical fertilizers (mainly phosphorous, calcium superphosphate, calcium magnesium phosphorous fertilizers, etc.), and 459,238 tons of granule fertilizers. These products have basically ensured a supply of fertilizers for growing cotton and wheat and have powerfully supported the effort to increase agricultural production.

G. "Red Flag" Awarded to the Chemical Experimental Factory in the Peiping City Native-Method Sulfuric Acid Interplant Competition

Hu Tou-nan

During last year's fourth quarter native-method sulfuric acid interplant competition at Peiping, the Peiping Chemical Experimental Plant won the glorious title of "Red Flag" plant.

Workers of the sulfuric acid shop of this plant, guided by the light of the party's general line, especially after the 8th Central Committee meeting of the Party's 8th Congress, energetically participated in the technical reform movement through various actions, including anti-rightist activity and diligent study. They have conducted numerous experiments on fluoride, arsenic and dust removal, and improved some of the equipment and flow sheet shortages. For example, their improvements lengthened the life of the pump base of the acid pump. In addition, various technical exhibitions and competitions stimulated further investigations. One of the results of these measures was an increased native method production of sulfuric acid. The national plan for 1959 was overfulfilled by 12%. Noticeable accomplishments were also reported in lowering raw material consumption, improving product quality, and raising labor production efficiency.

IV. NATIONAL LIST OF MODERN RED FLAG CHEMICAL INDUSTRY
UNITS FOR 1959

Pages 62-65

Unsigned article

A. Specially Awarded Units

Medicine

Shanghai Biochemistry Pharmaceutical Plant
Szechwan Pei-lin Antibiotics Plant
Shanghai 4th Pharmaceutical Plant

Rubber

Mukden Industrial Rubber Company
Shanghai First Great China Rubber Plant
Tsingtao 6th Rubber Plant
Tientsin Rubber Products Plant
Tientsin Carbon Black Plant

Dyestuffs

Second Shanghai China Dyestuff Plant
Kirin Dyestuff Plant

Plastics

Chungking Plastics Factory

Alkalies

Shanghai Tien-yuan Chemical Factory
Yung-li-chiu Tak Plant
Sodium Bicarbonate Shop of the Chingwangtao Yao-hua
Glass Factory
Fuchow Second Chemical Plant

Insecticide

666 shop of the Mukden Chemical Factory
Szechwan San-tai Hsien Insecticide Plant

Paint

Tientsin Paint and Dye Factory

Organic Material

Kirin Carbide Factory
Carbide shop of the San-min Chemical Factory
Hsi-hsin Solvent Factory

Acid

Sulfuric Acid Shop of the Nanking Yung-li-lin Factory
Sulfuric Acid Plant of the Hu-lu-tao 401 Factory
Wu-hsi Union Chemical Fertilizer Factory
Sulfuric Acid Shop of the Second Experimental Factory of
the Shanghai Research Institute
Canton Nitrogen Fertilizer Factory

Chemical Fertilizer

Kirin Fertilizer Factory
Calcium Magnesium Phosphorous Fertilizer Shop of the
Kunming Phosphorous Fertilizer Factory
Szechwan Chemical Factory

Mining

Chin-ping Phosphorous Mines
Hsiang-shan Pyrite Mines
Szechwan Hsin-wen Hsien Kwei-chia-yen Sulfur Mines

Hsien and Commune Industries

Ta-chi Hsien Chemical Plant
Mou-chi Shan Commune Chemical Plant
Ping-liang Hsien Kung-tung Commune Chemical Fertilizer Plant
Fukien Nan-an Chemical Plant
Ho-fei City Chu-shan Commune Chemical Fertilizer Plant

Large Complex Industry

Kirin Chemical Industry Company

Machinery Repairing

Machinery Repair Shop of the Nanking Yung-li-lin Factory
Mukden Rubber Mechanical Factory

Construction and Installation Industry

6th Field Shop of the Lan-chou Chemical Factory
Construction and Installation Company of the Taiyuan
Chemical Factory

B. Winning Units

Peiping City

Peking Pharmaceutical Factory
Peking Chemical Factory
Peking Yi-wu Chemical Factory
Peking Hsi-sze Chemical Factory
Peking Tire Manufacturing and Reconditing Factory
Peking Rubber Products Factory
Peking Hsien-wu Glass Factory
Peking Enamel Plant
Peking Synthetic Fiber Factory

Hopeh Province

Tientsin General Insecticides Factory
Tientsin Chemical Factory
Yung-li-chiu Taku Plant
Tientsin Pharmaceutical Factory
Northern China Oxygen Factory
Sixth Tientsin Dyestuff Plant
Sulfuric Acid Shop of the Chang-chia-kou Leather Products
Factory
Sulfuric Acid Shop of the Pao-ting General Chemical Factory
Tang-shan Suburban Chemical Plant
Chang-chia-kou Hu-chuan Sulfur Mines
Ping-shan Chemical Fertilizer Factory
Northern China Pharmaceutical Plant
Tientsin Nitrogenous Fertilizer Factory
Tientsin Carbon Black Factory
Tientsin Paint and Dyestuff General Factory
Tientsin Rubber Products Factory
Tientsin City Third Rubber Products Plant
Sodium Bicarbonate Plant of the Chin-huang-tao Yao-hua
Glass Factory

Inner Mongolia Autonomous Region

Ch'ih-feng Pharmaceutical Plant
Yu-shu-wan Sulfur Mines

Tung-liao Chemical Factory
Pao-to City Oxygen Factory
Paotow City Cooperative Chemical Factory

Shansi Province

Electrolysis Shop of the Taiyuan Chemical Factory
Sulfuric Acid Shop of the Taiyuan Chemical Factory
Shansi Phosphorous Fertilizer Factory
Taiyuan Plastics Factory
Oxygen Shop of the Shansi Chemical Factory
Ta-tung Pharmaceutical Plant
Wu-tai Chin-kan-ku Sulfur Plant
Ta-shih-wan Sulfur Shop of the Ho-chu Lung-kou Sulfur Factory
Hsin-ting Hsien Wei-hsin Commune Chemical Plant
Third Shop of the Yun-cheng Yen-yeh Chemical Bureau
Sodium Carbonate Shop of the Yun-cheng Yen-yeh Chemical Bureau
8th Shop of the Yun-cheng Yen-yeh Chemical Bureau
Ping-lu Hsien First Sulfur Plant
Chang-yeh City Wei-hsin Chemical Plant
Second Shop of the Yang-cheng Tung-yeh Sulfur Factory
Sulfur Shop of the Yang-cheng Chuan-mo-kou Sulfur Factory
Yang-chuan City Fifth Sulfur Factory
Yang-chuan City Sulfur Powder Factory
Yang-chuan City Hen-ta Chemical Factory
Construction and Installation Company of the Taiyuan
Chemical Factory
Computing Machine Group of the Installation Company of
the Taiyuan Nitrogenous Fertilizer Factory
Construction Company of the Taiyuan Nitrogenous
Fertilizer Factory
Operation Group of the Mechanization Station of the
Taiyuan Nitrogenous Fertilizer Factory
Electrical Group of the Installation Company of the
Taiyuan Nitrogenous Fertilizer Factory

Kirin Province

Tire Shop of the Ch'ang-ch'un City 8th Rubber Factory
Chi-an Boron Factory
Oil Black Plant of the Liao-yuan First Chemical Factory
Ch'ang-ch'un City Plastics Factory
Kirin City Second Chemical Factory
Kirin Chemical Industrial Company
Dyestuff Shop of the Kirin Chemical Industrial Company
Fertilizer Shop of the Kirin Chemical Industrial Company
Carbide Shop of the Kirin Chemical Industrial Company

Ming-cheng Mines of the Kirin Chemical Industrial Company
Steel Shop of the Kirin Chemical Industrial Company
Construction Unit of the Kirin Chemical Industrial Company
Machinery Plant of the Kirin Chemical Industrial Company
Carpenter Shop of the Steel Plant of the Kirin Chemical
Industrial Company

Liaoning Province

Mukden Chemical Factory
666 Shop of the Mukden Chemical Factory
Northeast General Pharmaceutical Plant
Dairen Dyestuff Factory
603 Shop of the 6th Northeast Pharmaceutical Factory
Third Boron Shop of the Liao-yang 375 Factory
Sulfuric Acid Shop of the Hu-lu-tao 401 Factory
Sulfuric Acid Plant of the Second Coke Shop of the
Pen-hsi Steel Company
Mukden Paint Factory
Mukden Oil and Fat Chemical Factory
Mukden Rubber Industrial Product Factory
Mukden City Tien-lin Rubber Factory
Dairen Oil Fat Chemical Factory
Port Arthur and Dairen Potassium Chloride Factory
6th Shop of the An-tung City An-tung Pharmaceutical Factory
An-tung City An-tung Second Chemical Factory
Fu-shun First Petroleum Refinery
Sulfuric Acid Shop of the An-shan Steel Company General
Chemical Factory
Fu-shun Hua-feng Chemical Factory
Fu-shun City Second Chemical Factory
Hsin-peng Pyrite Mines
Machinery Shop of the Chin-hsi Chemical Factory
Organic Glass Shop of the Chin-hsi Chemical Factory
Anti-corrosion Shop of the Branch Institute of the
Chin-hsi Chemical Design Research Institute
Intermediate Shop of the Branch Institute of the
Chin-hsi Chemical Design Research Institute
Feng-cheng Erh-tai-tze Boron Plant
Liao-yang Medical Equipment Factory
Dairen Chemical Factory
Machinery Shop of the Dairen Chemical Factory
Mukden Rubber Machinery Factory
Carbon Black Plant of the Fu-shun Mine Bureau
Dairen First Plastics Factory
Mukden Industrial Rubber Company

Heilungkiang Province

Shao-chou Chemical Factory
Shui-cheng Nitrogenous Fertilizer Factory
Chia-mou-szu Plastics Factory
Tsitsihar City Rubber Factory
Fu-lar-chi Carbide Factory
Harbin Pharmaceutical Factory
Harbin Chemical Laboratory
Harbin Paint Plant
Harbin Chemical Rubber Factory
Heilungkiang Chemical Factory
Carbide Plant of the Harbin Chemical General Factory
Mutan Kiang Pharmaceutical Factory
Mutan Kiang Chemical Material Factory
3rd Shop of the First Plant of the Hua-lin Rubber Factory
Lung-kiang Synthetic Factory
Sodium Carbonate Shop of the Chia-mou-szu Foods Plant
Harbin City Second Carbon Vulcanization Plant
Mou-chi-shan Commune Chemical Plant

Shanghai City

China Mineral Industry Raw Material Factory
China Gas Factory
Chin-hsin Chemical Factory
Second Great China Rubber Factory
Wan-kuo Rubber Factory
Shanghai Chemical Factory
Min-hua Rubber Factory
Wusung Sulfuric Acid Plant of the Shanghai Sulfuric Acid Factory
Catalyst Shop of the Shanghai Tung-yung Pharmaceutical Factory
Shanghai Lee-min Pharmaceutical Factory
First Great China Rubber Factory
Shanghai Biochemical Pharmaceutical Factory
Shanghai 4th Pharmaceutical Factory
Shanghai Second China Dyestuff Factory
Shanghai Tien-yuan Chemical Factory
Nitric Acid Plant of the Second Laboratory of the Shanghai
Chemical Research Institute
Oxygen Plant of the Second Laboratory of the Shanghai
Chemical Research Institute
Sulfuric Acid Plant of the Second Laboratory of the Shanghai
Chemical Research Institute (for the 4,000 ton contact process)

Kiangsu Province

Nanking Chemical Factory
Nanking Plastics Factory
Nanking Rubber Factory
Nanking Chiang-tung Chemical Factory
Chin-lin Chemical Factory
Chun-chung Chemical Factory
Chiang-lin Chemical Factory
Wuhsi Rubber Factory
Wuhsi Resin Factory
Wuhsi Electrical Factory
Wuhsi Insecticide Factory
Sulfuric Acid Plant of the Wuhsi Refinery
Hsi-hsin Solvent Plant
Soochow Pharmaceutical Plant
Chin-ping Phosphorous Mines
Soochow Insecticide Factory
Chang-hsu Tung-hsieh-cheng Plastics Factory
San-wu Chemical Factory
Cheng-chiang Lien-yeh Electrical Factory
Wu-chin Chemical Factory
Yi-hsin Chemical Porcelain Factory
Chang-chou Refinery
Chang-chou Union Chemical Factory
Chang-chou Chemical Building Materials and Equipment Factory
Nan-tung Rubber Factory
Nan-tung Pharmaceutical Plant
Nan-tung Acetic Acid Factory
Chi-tung Chemical Factory
Hsu-chien Phosphorous Fertilizer Factory
Sodium Carbonate Shop of the Kuang-hua Chemical Factory
Hsu-chou Plastics Factory
Hsu-chou Ku-lou Oil Chemical Factory
Hsu-chou Carbide Factory
Yang-chou District Pyrite Mines
Tai-hsin Chemical Factory
Yang-chou Red Flag Chemical Fertilizer Factory
Hsien-yang Pharmaceutical Factory
Yang-ma Commune Chemical Plant
Hsin-hai Lien-huang Sulfur Factory
Hsu-chou Rubber Factory
Public Utility Company of the Nanking Chemical Industrial Corporation
Machinery Repair Plant of the Public Utility Company of the Nanking Chemical Industrial Corporation

Chemical Machinery Manufacturing Plant of the Nanking Chemical Industrial Corporation
Sulfur Shop of the Phosphorous Fertilizer Factory of the Nanking Chemical Industrial Corporation
Machinery Repair Shop of the Phosphorous Fertilizer Factory of the Nanking Chemical Industrial Corporation
Soochow Sulfuric Acid Factory
Chang-chou Dyestuff Factory
Soochow Carbon Black Factory
Iron Smelting Shop of the Nanking Chemical Industrial Corporation
Sulfuric Acid Plant of the Yung-li-lin Factory of the Nanking Chemical Industrial Corporation
Machinery Repair Shop of the Yung-li-lin Factory of the Nanking Chemical Industrial Corporation

Chekiang Province

Chemical Shop of the Min-san Pharmaceutical Plant
First Mining Area of the Ping-yang Joint Alum Mining and Processing Company
Chia-hsin Insecticide Factory
Huang-yen Chemical Factory
Lan-hsi High Furnace Calcium Magnesium Phosphorous Fertilizer Factory
Ta-tung Electrical Factory

Kiangsi Province

Kan-nan Chemical Factory
Chang-hsu Phosphorous Fertilizer Factory
Fu-ho Chemical Factory
One award reserved (to be determined by the Kiangsi Province Chemical Industry Bureau)

Shantung Province

Tsinan Yu-hsin Chemical Factory
Tsinan Yung-lin Pharmaceutical Plant
Tsinan Rubber Factory
Tsingtao 6th Rubber Factory
Jih-tai Hsien Kung-li Commune Chemical Fertilizer Plant
Tsingtao 2nd Rubber Factory
Tung-tai Rubber Factory
Hsin-hua Pharmaceutical Plant
Chang-tien Pharmaceutical Plant
Tzu-po Red Clay Plant
Chu-cheng Chemical Fertilizer Factory

Liang-shan Bacteria Fertilizer Factory
Kao-mi Hsien Chemical Factory
4th Shop of the Tsingtao Szu-fang Chemical Factory
Magnesium Sulfate Shop of the Tsingtao Shih-yeh Chemical Factory
3rd Shop of the Tsinan Chemical Factory

Hupei Province

Wuhan City Chiu-an Pharmaceutical Plant
Wuhan City Ke-lien Chemical Factory
Wuhan City Hupei Pharmaceutical Plant
Wuhan Pharmaceutical Factory
Wuhan City Han-chang Chemical Factory
Wuhan City Hsin-kang Chemical Factory
Ichang City Sulfuric Acid Factory
Ichang Hsien Sulfuric Acid Factory
Ichang Hsi-lin Chemical Factory
I-tu Chemical Fertilizer Factory
Hsiang-fan Sulfuric Acid Factory

Hunan Province

Heng-yang District Chien-heng Chemical Factory
Leng-shui-tan Chemical Factory
Ta-lee Chemical Factory
Chang-lin Alum Factory
Pin-hsien District Lai-yang Chemical Factory
Hsiang-tan District Ping-teng Chemical Factory
Hunan Insecticide Factory
Lin-hsiang Chemical Factory
Hsiang-tan City Chemical Factory
Sang-chih Wu-lee-hsi Sulfur Mines
Chi-shui Chemical Factory
Chang-teh District Hunan Realgar Mines
Tao-chiang Vulcanization Factory
I-yang Sulfuric Acid Factory
Shao-yang District Shao-yang City Chemical Factory
Yao-tou-shan Sulfur Mines
Changsha City I-hua Chemical Factory
Chien-hsiang Paint Factory
Lee-hua Rubber Factory
Changsha City Red Flag Chemical Factory
Hsiang-chiang Chemical Factory
Hunan Pharmaceutical Plant
Insecticide Shop of the Chu-chou Chemical Factory
Heng-yang Plastic Products Factory

Honan Province

Loyang Tire Factory
Chengchow City Rubber Factory
Kai-feng City Rubber Products Factory
Shang-chu Hsien Chemical Factory
Chiu-tso Sulfuric Acid Factory
Loyang Sulfuric Acid Factory
Chemical Plant of the Cheng-chou Cith "1 July" Commune Water
Conservation Bureau
Tang-ho Chemical Factory
Chi-yuan Chemical Factory
Chi-yuan Hsia-yeh Sulfur Mines
Chang-chou Insecticide Factory
Hsu-chang City Suburban Chemical Fertilizer Factory
Chia Hsien Chemical Factory
Chang-ping Hsien Chemical Factory
Lin-ju Phosphorous Fertilizer Factory
Wei-shih First Chemical Fertilizer Factory

Anhwei Province

Hofei Integrated Chemical Factory
Hofei City Chu-shan Commune Chemical Fertilizer Factory
Wuhu City Chang-chiang Chemical Factory
Wuhu Feng-huang Paint Plant
Wuhu Lien-mang Chemical Fertilizer Factory
Peng-pu Chiang-huei Chemical Factory
An-ching Paint Factory
Hai-shan Complex Chemical Factory
Anhwei Province Commerce Bureau Pharmaceutical Factory
Hsiung-shan Pyrite Mines
Chu Hsien Chemical Factory
Wan-chiang Hsien Chemical Factory
Po Hsien Chemical Factory
Yao-hsi Hsien Chemical Factory
Carbide Shop of the Hofei Chemical Factory

Fukien Province

Foochow Antibiotic Plant
Foochow Pharmaceutical Factory
Foochow Second Chemical Factory
Chien-ao Chemical Factory
Nan-an Chemical Factory
Carbide Shop of the San-min Chemical Factory

Kwangtung Province

Canton Nitrogenous Fertilizer Factory
Ke-san Printing Ink Plant
National Eleventh Rubber Factory
Tung-chu Sulfuric Acid Factory
Nan-hai Chemical Fertilizer Factory
Hsin-chun Pharmaceutical Factory
Ho-pu Tien-shan Integrated Smelting Factory
Fan-kou Integrated Chemical Factory
Hsiang-hsiu-li Shop of the Ho-chi-kung Pharmaceutical Plant
Tung-feng Hsien Chemical Factory
Chiang-men Chemical Machinery Factory

Kwangsi Chuang Autonomous Region

Lu-chou Chemical Fertilizer Factory
Shang-szu Chemical Factory
Ching-hsi Ken-tsun Sulfur Mines
Po-pe Insecticide Factory
Hypodermic Needle Shop of the Kweilin Pharmaceutical Plant
Calcium Magnesium Phosphorous Fertilizer Shop of the
Yun-lin District Chemical Factory

Szechwan Province

Chungking Chung Nan Rubber Factory
Chungking Pharmaceutical Plant
I-lung Chemical Fertilizer Factory
Tung Shan Calcium Magnesium Phosphorous Fertilizer Factory
Tung-shan Phosphorous Fertilizer Factory
Chungking Tire Factory
400-ton small contact-process sulfuric acid shop of the
Chungking Insecticide Factory
Chungking Plastics Factory
Szechwan Chemical Factory
San-tai Hsien Native Insecticide Plant
Pei-lin Antibiotics Plant
Ta-chi Chemical Factory
Hsin-wen Hsien Kwei-chia-yen Sulfur Mines
Lung-chang Gas Well Area of the Southern Szechwan Mine Bureau

Kansu Province

Lan-chou City Ta-sha-ping Chemical Factory
Lan-chou Rubber Products Factory
Lan-chou Bone Fertilizer Factory

Yu-men City Chemical Factory
Tienshui Pei-tao Commune Chemical Fertilizer Factory
Lan-chou Chemical Factory
Construction Company of the Lan-chou Chemical Factory
Machinery Branch Plant of the Lan-chou Chemical Factory
Synthetic Ammonia Branch Plant of the Lan-chou Chemical Factory
6th Working Field Shop of the Lan-chou Chemical Factory
Lan-chou Chemical Machinery Factory
Ping-liang City Kung-tung Commune Chemical Fertilizer Factory

Yunnan Province

Kunming Chien-yun Chemical Factory
Kunming Ta-lee Chemical Factory
Kunming Rubber Factory
Kunming Union Pharmaceutical Factory
Kunming Glassware Factory
Kunming Yu-hsi Nitrogenous Fertilizer Factory
Kunming Phosphorous Fertilizer Factory
Second Shop of the Kunming City Pharmaceutical Factory
Electrolysis Shop of the Kunming Ta-lee Chemical Factory
Chu-ching District Chien-chin Chemical Factory
Hou-ching Hsien Hsin-tsun Sulfur Mines
Liberation Army Chemical Fertilizer Factory
Calcium Magnesium Phosphorous Fertilizer Shop of the Kunming
Phosphorous Fertilizer Factory

Kweichow Province

Hung-yen Chemical Factory
Tsun-i Chemical Factory
Red Flag Coal Low-Temperature Distillation Plant
Sui-yang Hsien Tung-feng Sulfur Mines
An-lung Hsien Ta-pa Sulfur Mines
Kweichow Rubber Plant

Shensi Province

Sian Wei-yang Integrated Chemical Factory
Sian Plastic Products Factory
Sian Insecticide Factory
Sian Pharmaceutical Plant
Sian Chemical Factory

Tsinghai Province

Ts'a-erh-han Potassium Fertilizer Factory
Ta-tsai-tan Boron Mines
Tsinghai People's Chemical Factory
Tsinghai Fertilizer Factory

Ningsia Hui Autonomous Region

Wu-chung Integrated Fertilizer Factory

Sinkiang Uighur Autonomous Region

Casting Shop of the Sinkiang Chemical Industry Bureau of
the Installation and Engineering Department
Ta-peng-cheng Chemical Factory

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